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TO THE ASSISTANT COMMISSIONER FOR PATENTS

Transmitted herewith for filing under 35 U.S.C. 111 and 37 C.F.R. 1.53 is the patent application of:

JEFFREY L. HUCKINS

For: **CONTROLLING REMOTE STORAGE DEVICES**

Enclosed are:


- ☒ Certificate of Mailing with Express Mail Mailing Label No. **EL594059765US**  
☒ **Three (3)** sheets of drawings.  
☐ A certified copy of a \_\_\_\_\_ application.  
☒ Declaration ☒ Signed. ☐ Unsigned.  
☒ Power of Attorney  
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☐ Preliminary Amendment  
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CLAIMS AS FILED

For	#Filed	#Allowed	#Extra	Rate	Fee
Total Claims	30	- 20 =	10	x \$18.00	\$180.00
Indep. Claims	6	- 3 =	3	x \$78.00	\$234.00
Multiple Dependent Claims (check if applicable) <input type="checkbox"/>					\$0.00
BASIC FEE					\$690.00
TOTAL FILING FEE					\$1,104.00

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Dated: **August 31, 2000**

  
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APPLICATION

FOR

UNITED STATES LETTERS PATENT

TITLE: CONTROLLING REMOTE STORAGE DEVICES

INVENTOR: JEFFREY L. HUCKINS

Express Mail No.: EL594059765US

Date: August 31, 2000

## CONTROLLING REMOTE STORAGE DEVICES

### Background

This invention relates generally to controlling storage devices in multicast networks.

5 A multicast network may enable messages to be sent to a target group of clients that constitute a subset of all of the networked clients. Generally, multicasting is accomplished by including, within a header for example, the addresses of all the subject clients that are addressed.

10 In some multicasting environments, it may be desirable to control the storage devices, such as hard disk drives, of targeted clients. As examples, a server or head-end of a multicast system may determine what information is stored on one or more clients' storage devices. This head-end control may be done with the consent of the client's owner.  
15 Thus, the server can determine how to effectively utilize the available disk space on a given client. In some cases, the server may also, in effect, sell or lease access to the available storage space on clients whose storage devices are controlled by the server or head-end.

20 Thus, there is a need for ways to control the storage devices of one or more clients either individually or as a group in a multicast environment.

### Brief Description of the Drawings

Figure 1 is a schematic depiction of one embodiment of the present invention;

Figure 2 is a flow chart for software resident on the client shown in Figure 1 in accordance with one embodiment of the present invention; and

Figure 3 is a flow chart for software resident on the server or head-end in accordance with one embodiment of the present invention.

### Detailed Description

Referring to Figure 1, a network may include at least one server or head-end 10 and a plurality of clients 12 (only one of which is shown). The server 10 may be coupled to a plurality of clients (including the client 12) through a distribution system that may be based on a wired system or a wireless or broadcast system. Examples of such networks include television distribution networks such as digital video broadcasting systems.

In one embodiment of the present invention, the server 10 may communicate with the clients 12 over a transport 14. The transport 14 may be in accordance with an analog or digital broadcasting system. As one example, the transport 14 may be compliant with the Digital Video Broadcast (DVB); Network-independent Protocol, ETS 300802, dated November 1997 and available from the European Telecommunications Standards Institute (ETS), Valbonne, France. The transport

14 may be a satellite, cable or airwave broadcasting system as examples.

In accordance with embodiments of the present invention, the client 12 recognizes messages directed  
5 individually to that client 12 from the server 10 or in some embodiments, from other clients 12. Bandwidth may be conserved by addressing messages to a group of clients without the need to insert, within header, the individual identifiers of each of a large number of addressed clients.

10 In addition, the client 12 may include one or more addressable agents 44, 46 and 48 that may be independently addressed by remote units such as the server 10. Moreover, by providing addressable agents 44, 46 and 48 within a given client 12, messages that are specialized or which  
15 need specialized handling may be addressed to particular agents resident on the client 12 for appropriate handling.

The server 10 may include a software download and update server 16. The server 16 is responsible for transmitting software or software updates to the client 12.  
20 The server 16 transmits messages which include a distinct service identifier (e.g., service\_id=0x01). The server 10 may also include an instant messaging or short message service (SMS) server 18 that also transmits messages having a distinct service identifier (e.g., service\_id=0x02).

25 In addition, a client disk management server 20 may be provided as well. The client disk management server 20 may

transmit messages that include one or more distinct service identifiers (e.g., service\_id=x). In some cases, a variety of messages may be issued by the client disk management server 20 in order to initiate desired functions on a client's storage device or disk drive. For example, separate service identifiers may be utilized for the commands to create partitions, delete partitions, or modify partitions, as examples.

In accordance with one embodiment of the present invention, the server 10 may implement a unidirectional messaging system. In a unidirectional messaging system, the server 10 may transmit messages to a plurality of clients that are unable to respond in any way. One example of such a network is a direct-to-home (DTH) broadcast network that may be compliant with the DVB protocol. The network may use a connection oriented communication protocol or a real time connectionless communication protocol as two examples. There are many applications of unidirectional messaging from server to client such as instant messaging, command and control and notification and signaling, as examples. In other cases, the network may be a bidirectional network, for example with an Internet Protocol (IP) multicast backbone.

In one embodiment of the invention, the server 10 may include a unidirectional messaging server (UMS) 22 that is coupled to the servers 16, 18 and 20 to generate messages

in an appropriate format. The messages transmitted by the UMS server 22 may include messages originally generated by one of the servers 16, 18 or 20. The UMS server 22 may then be coupled to an Internet Protocol multicast module 24 that places the messages in an appropriate multicast protocol format. Finally, a DVB Multiprotocol Encapsulation (MPE) 26 is coupled to the Internet protocol multicast module 24. The MPE is described in DVB Specification for Data Broadcasts (EN 301 192) and Specification for Service Information (SI) in DVB Systems (EN 300 468 V1.3.1 1998-02) both available from the ETS. The output of the DVB MPE 26 and a DVB-Service Information (SI) generator 28 are coupled to the transport 14. Service Information is digital data describing the delivery system, content and scheduling/timing of broadcast data streams.

In the client 12, the stream from the DVB-SI generator 28 is coupled to a DVB-SI receiver 40 and service acquisition module 38. The service acquisition module 38 extracts a program identifier (PID) and provides it to a DVB demultiplexer 32. A tuner 30 may tune the client 12 to the appropriate channel corresponding to the extracted program identifier.

The message from the DVB MPE 26 is provided to a DVB MPE receiver 42. The receiver 42 communicates with an IP multicast module 40 and a unidirectional messaging server 38. The server 38 breaks down the message to determine

whether a service identifier was included in the data stream. If so, the message is forwarded to an appropriate agent designated to receive messages with particular service identifiers.

5           A disk management agent 44 may be coupled to a disk drive controller 47 in turn coupled to a storage device 45 that may, for example, be a hard disk drive. The disk management agent 44 may be addressed as a message recipient by the client disk management server 20. The disk  
10 management agent 44 may cause processes to be undertaken through the controller 47 that in turn control the use of the storage device 45. This control may include determining what information is stored on the storage device 45 and how that information is stored on the storage  
15 device 45.

          In one embodiment of the present invention, the software download and update server 16 may provide a specific message identifier that causes its message to be received by a software download agent 48 tuned to a  
20 particular service identifier. Similarly, messages from the instant messaging server 18 may include a service identifier that cause those messages to be forwarded to an instant messaging agent 46 in the client 12. Likewise, messages from other servers 20 may have appropriate  
25 identifiers that cause them to be shunted to particular agents 44 on the client 12.



The server 10 may include a storage 25 that stores software 70 for controlling the operation of the server 22. Likewise, the server 38 on the client 12 may be coupled to a storage 45 that stores software 50 that controls the operation of the server 38. The servers 22 and 38 may also be processor-based systems.

Turning next to Figure 2, the software 50 on the client 12 initially receives the unidirectional messaging server address and port from the server 10. The client 12 may also be assigned a client identifier as indicated in block 52. Thus, an Internet Protocol multicast system may be established wherein each client has a UMS address and port as well as a unique client identifier, assigned by the server 10. In some embodiments, the server 10 may dynamically adjust addresses and ports as well as client identifiers to enable communication of particular messages, message groups or types of messages to particular clients in a dynamic and reconfigurable fashion.

Having received its address, port and client identifier, the client 12 receiver joins a multicast group and listens for messages addressed specifically to it or to any groups that the client 12 belongs to, as indicated in block 54.

A disk management agent 44 registers its service identifier with the UMS server 38 as indicated in block 56. When the UMS server 38 receives a packet with a UMS

message, as indicated in block 58, a check determines whether the particular client 12 is the intended recipient as indicated in diamond 60. If not, the message is discarded as indicated in block 62.

5           However, if the particular client 12 is the intended recipient, the server 38 checks the message's service identifier and passes the message to the correct agent 44, 46 or 48, as indicated in block 64. The message is then delivered to the appropriate agent 44, 46 or 48, as  
10 indicated in block 66. In the agent, the information is parsed and passed to an appropriate process for handling as indicated in block 68.

          For example, when addressed, the disk management agent 44 sends appropriate commands to the controller 47 for  
15 relay to the storage device 45. Dependent on the service identifier accompanying the message, the agent 44 may provide appropriately translated commands to the controller 47 such as the commands to create a partition, delete a partition or modify a partition. Each of these commands  
20 may be given separate service identifier values such as 0x03, 0x04 and 0x05. The disk management agent 44 may translate a message with a service identifier value into an appropriate format for the controller 47 based on the message received from the client disk management server 20.  
25 For example, with a message that includes a service

identifier value 0x03, the agent 44 may issue a command to the controller 47 to partition the storage 45.

On the server side, shown in Figure 3, the network software 70 begins by assigning multicast addresses and ports for unidirectional messaging service to a plurality of clients 12 as indicated in block 72. The server 10 may also assign client identifiers in a dynamic and reconfigurable fashion. The address, port and client identifiers are then transmitted to the clients as indicated in block 74.

Thereafter, the disk management server 20 may create a data structure and pass this data structure to the server 22 as indicated in block 76. The server 22 creates a unidirectional message and assigns a client value, sets a group flag, and copies private data in the private bytes of the message as indicated in block 78. More particularly, a unique client identifier may be assigned. The client identifier may either be a particular preassigned client identifier or, as one example, may be zero when multiple clients are targeted. A group flag may be a Boolean value specifying whether the client identifier is a group mask or a particular identifier. A group mask is an identifier that identifies a subset of the clients 12 on the network. This subset may include a plurality of clients but less than the total number of addressable clients.

As one example of a unidirectional message header, the message may include a number of variables including a group\_mask, a service\_id, a version\_id, a message\_id, and a private\_data\_byte. The group\_mask may, in one embodiment of the present invention, include 64 bits, the service\_id may include eight bits, the version\_id may include sixteen bits, the message\_id may include eight bits and the private\_data\_byte may include eight bits. The group\_mask may be exclusive ORed with the client identifier of each unique client 12 to determine if the client 12 is the intended recipient. The version\_id is the version of the unidirectional messaging protocol and may initially be set to zero. The service\_id may be a service identifier that may be as two examples 0x01 for a software and download and update service or 0x02 for an instant messaging service. Advantageously, the message size does not exceed 1,024 bytes in order to eliminate potential datagram fragmentation. The group\_filter may be used in conjunction with the client\_id field to limit the size of the private data bytes required for an application. Each of header items may include an unsigned integer most significant bit first (uimbsf) identifier in accordance with the DVB specification except for the private\_data\_byte which may include a bit string, left bit first (bslbf) identifier.

As indicated in block 80, the message is then sent to all the clients 12 on the network. Each client then

determines whether the message is intended for that client. The client 12 determines whether it is the specific intended recipient by determining whether the message is addressed to the client identifier of the client 12. For example, using an AND logic operator between the message's identifier and the client's identifier, the client 12 may determine if the client 12 is within a group of clients jointly addressed by the server 10.

In one embodiment of the present invention, distinct groups of users may receive common client identifier elements. Thus, a plurality of clients whose owners have signed up for enhanced service may include a common code portion in their client identifier. When a message including that common code portion in the client identifier is received, each of those clients accepts the message. Likewise, clients in particular geographic areas, having particular interests or otherwise identifiable clients may be given unique prefixes/suffixes or identifier code portions. The code portion may be logically ANDed with a group\_mask to determine whether a particular client is a member of the targeted group.

The management message header may also include fields to address the disk management agent 44, such as a volume\_name\_len field that provides the volume, name, length and bytes for the pertinent volume of a storage device 45 in the form of a hard disk drive. In one

embodiment of the present invention, that field may be eight bits long and may have a bslbf identifier. In addition, a volume\_name\_byte field may give the volume name bytes that make up the name of the volume to mount on which to create a partition. In one embodiment of the present invention, this field may be eight bits long and may include a bslbf identifier. Finally, a partition\_size field may give the size of the partition to create in bytes. This field may be thirty-two bits in size and may use the uimsbf identifier. Of course, additional fields and additional service identifiers may be utilized to implement still additional commands to the client storage device 45.

In this way, the client disk management server 20, under the direction from the server or head-end 10, may control how the storage 45 is set up and utilized on a targeted client 12 or a targeted group of clients 12. Each of the clients 12 may be individually addressed, the entire set of clients may be addressed or any subgroup of clients may be collectively addressed such that their storage devices 45 may be individually or collectively modified. Thus, the storage devices 45 of one or more clients may be selectively controlled from the server 10.

While the present invention has been described with respect to a limited number of embodiments, those skilled in the art will appreciate numerous modifications and

variations therefrom. It is intended that the appended claims cover all such modifications and variations as fall within the true spirit and scope of this present invention.

What is claimed is:

OFFICE OF THE SECRETARY





1           6.    The method of claim 5 including comparing a group  
2    identifier, received by a client with a message, to the  
3    client's individual identifier to determine whether the  
4    particular client is within the addressed subset.

1           7.    The method of claim 2 including addressing the  
2    same message to a subset of clients.

1           8.    The method of claim 2 including sending a message  
2    to a client in a unidirectional messaging system.

1           9.    The method of claim 1 including receiving a  
2    message including an identifier which specifies a task to  
3    perform on a storage device.

1           10.   The method of claim 9 including receiving a  
2    message including an identifier indicating a change to a  
3    partition on said storage device.

1           11.   An article comprising a medium storing  
2    instructions that enable a processor-based system to:  
3                receive on a first client a message from a server  
4    addressed to said client; and  
5                control the storage of information on said client  
6    based on information included in said message.



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1           16. The article of claim 15 further storing  
2 instructions that enable the processor-based system to  
3 compare a group identifier, received by a client with a  
4 message, to the client's individual identifier to determine  
5 whether the client is within the address subset.

1           17. The article of claim 12 further storing  
2 instructions that enable the processor-based system to  
3 address the same message to a subset of clients.

1           18. The article of claim 12 further storing  
2 instructions that enable the processor-based system to send  
3 a message to a client in a unidirectional messaging system.

1           19. The article of claim 11 further storing  
2 instructions that enable the processor-based system to  
3 decode a command within said message to modify the storage  
4 of information on a storage device.

1           20. The article of claim 19 further storing  
2 instructions that enable the processor-based system to  
3 modify a partition on said storage device in response to a  
4 command included within said message.

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1           21. A system comprising:  
2                 a processor-based device; and  
3                 a storage storing instructions that enable said  
4 processor-based device to receive a message from a server  
5 addressed to said processor-based device and control the  
6 storage of information on said processor-based device based  
7 on the information included in said message.

1           22. The system of claim 21 wherein said storage  
2 stores instructions that enable the device to compare a  
3 group identifier in a message to determine whether the  
4 device is within a group addressed by said server.

1           23. The system of claim 22 including a comparator  
2 that compares a group identifier, received by the device  
3 with a message, to the device's individual identifier to  
4 determine whether the particular device is within the  
5 addressed subset.

1           24. A method comprising:  
2                 transmitting a message to a client; and  
3                 controlling the storage of information on said  
4 client based on information included in said message.

1           25. The method of claim 24 including transmitting a  
2 message including an identifier which specifies a task to  
3 perform on a storage device.

1           26. The method of claim 24 including transmitting a  
2 message to an agent on said client to cause the client to  
3 alter the way information is stored on said client.

1           27. An article comprising a medium storing  
2 instructions that enable a processor-based system to:  
3           transmit a message to a client; and  
4           control the storage of information on said client  
5 based on information included in said message.

1           28. The article of claim 27 further storing  
2 instructions that enable a processor-based system to  
3 transmit a message including an identifier which specifies  
4 a task to perform on a storage device.

1           29. The article of claim 27 further storing  
2 instructions that enable a processor-based system to  
3 transmit a message to an agent on said client to cause the  
4 client to alter the way information is stored on said  
5 client.



## CONTROLLING REMOTE STORAGE DEVICES

### Abstract of the Disclosure

A messaging system may enable a server to assign unique identifiers to a plurality of clients. These identifiers enable a client to determine whether a message is specifically targeted to that client or, as an alternative, whether the client is a member of a group of targeted clients. A server may send messages containing an identifier to agents on one or more clients. The identifier may specify commands to control the storage of information on one or more clients.

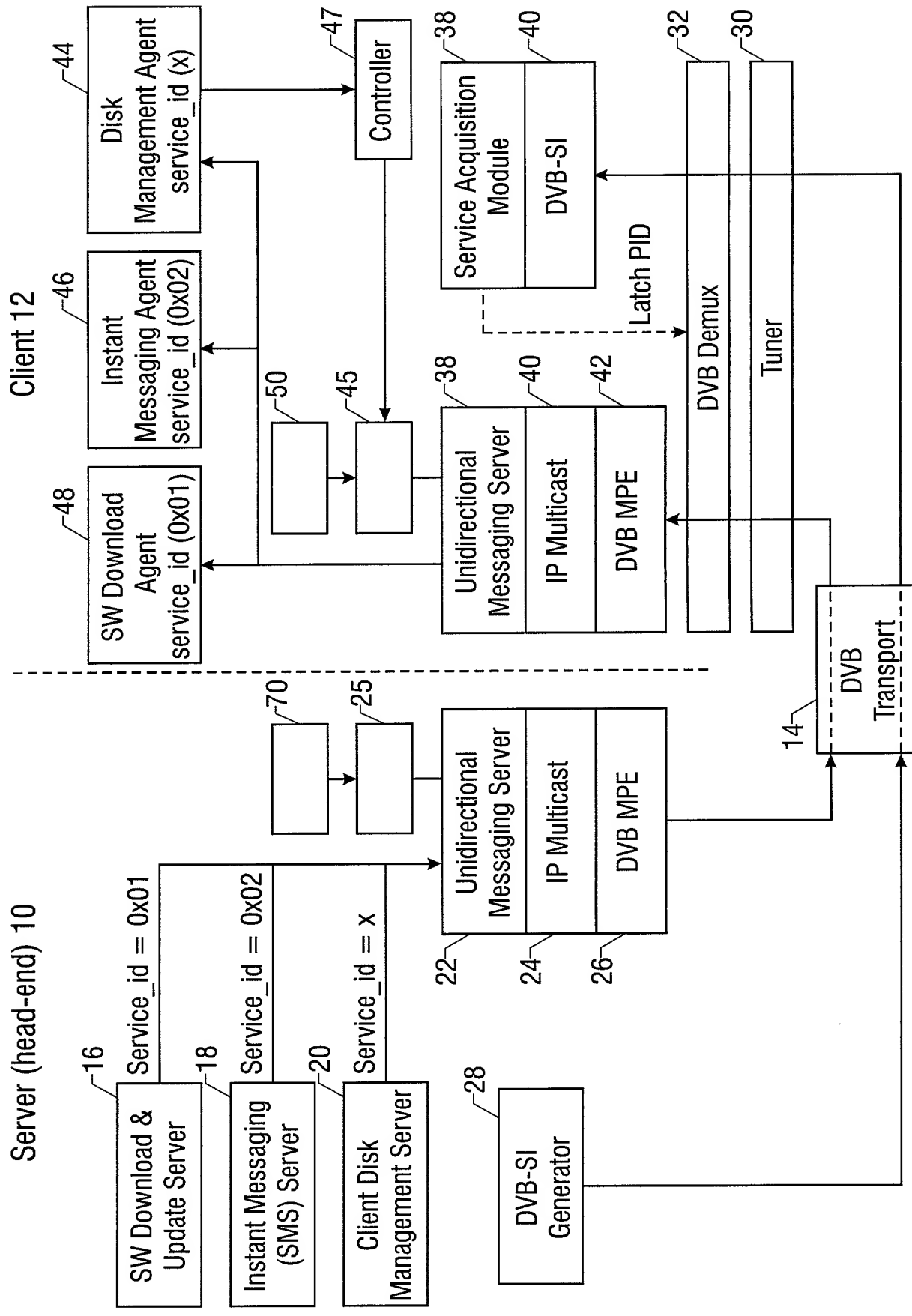


FIG. 1



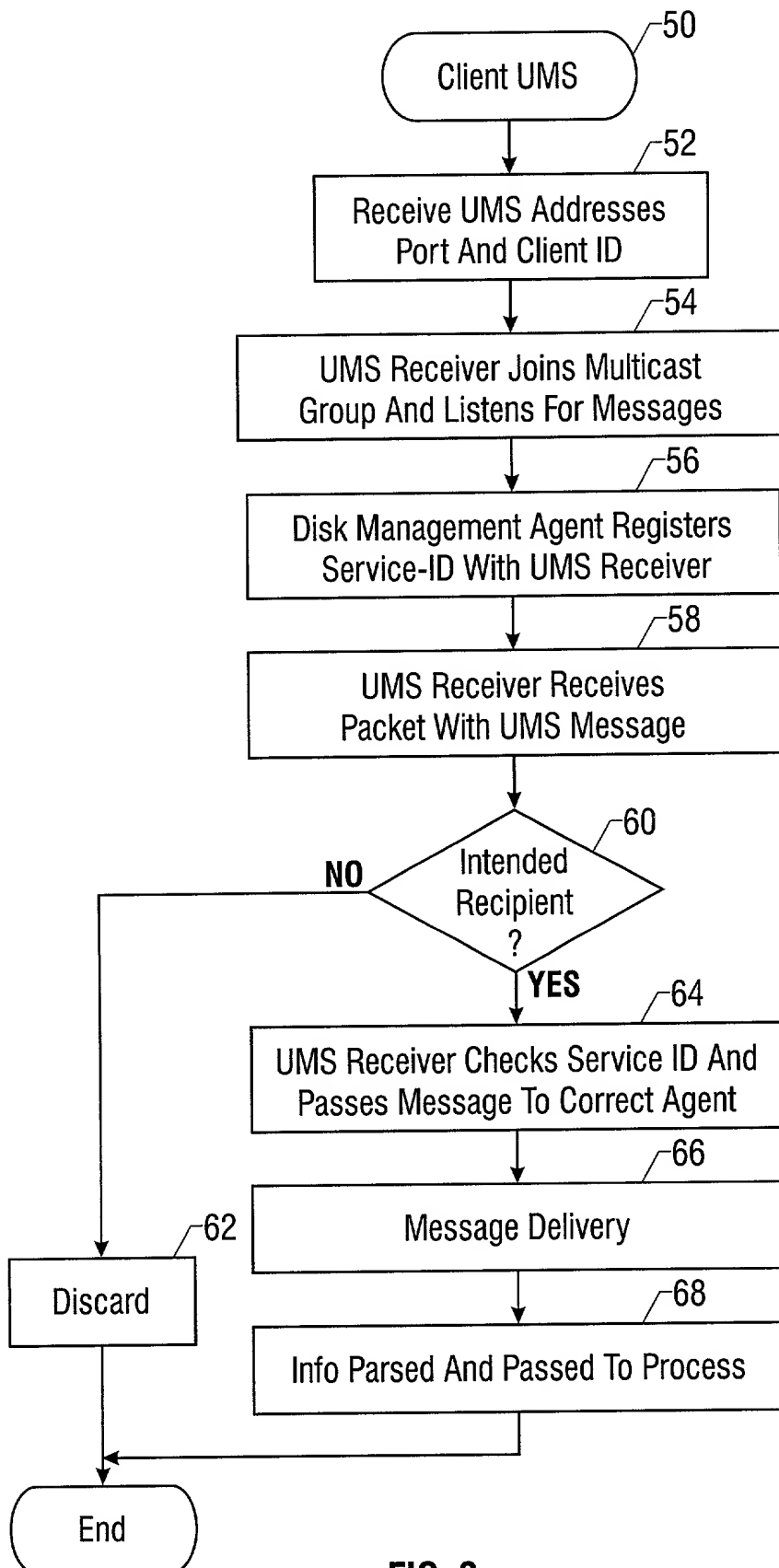
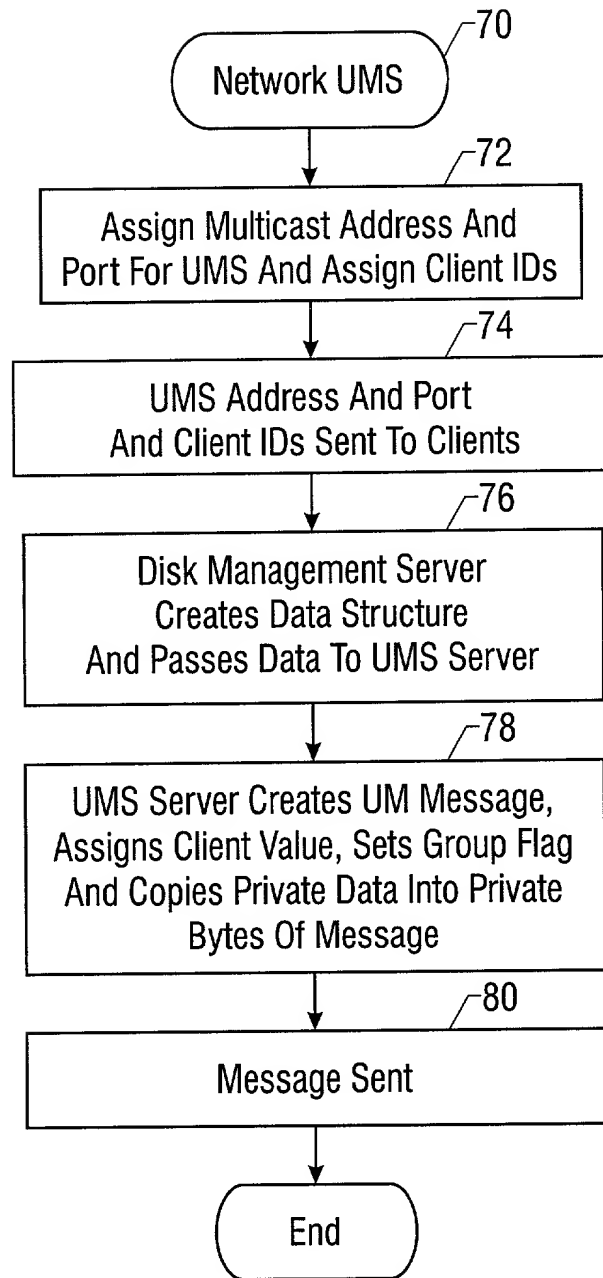


FIG. 2



**FIG. 3**

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below, next to my name.

I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first, and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

CONTROLLING REMOTE STORAGE DEVICES

the specification of which

X	is attached hereto.
	was filed on _____ as
	United States Application Number _____
	or PCT International Application Number _____
	and was amended on _____
	(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claim(s), as amended by any amendment referred to above. I do not know and do not believe that the claimed invention was ever known or used in the United States of America before my invention thereof, or patented or described in any printed publication in any country before my invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, and that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months (for a utility patent application) or six months (for a design patent application) prior to this application.

I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d), of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

<u>Prior Foreign Application(s):</u>			<u>Priority Claimed</u>	
Number	(Country)	(Day/Month/Year Filed)	Yes	No
Number	(Country)	(Day/Month/Year Filed)	Yes	No
Number	(Country)	(Day/Month/Year Filed)	Yes	No

I hereby claim the benefit under title 35, United States Code, Section 119(e) of the United States provisional application(s) listed below:

_____	_____
(Application Number)	(Filing Date)
_____	_____
(Application Number)	(Filing Date)

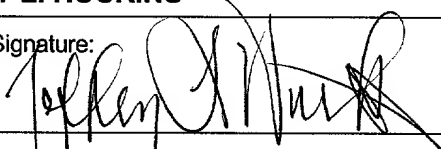
I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

_____	_____	_____
(Application Number)	Filing Date	(Status-patented, pending, abandoned)
_____	_____	_____
(Application Number)	Filing Date	(Status-patented, pending, abandoned)

I hereby appoint Timothy N. Trop, Reg. No. 28,994; Fred G. Pruner, Jr., Reg. No. 40,779 and Dan C. Hu, Reg. No. 40,025 my patent attorneys, of TROP, PRUNER & HU, P.C., with offices located at 8554 Katy Freeway, Ste. 100, Houston, TX 77024, telephone (713) 468-8880, and Mirho, Charles A.; Registration No. 41,199; Novakoski, Leo V.; Registration No. 37,198; Reynolds, Thomas C.; Registration No. 32,488; Seddon, Kenneth M.; Registration No. 43,105; Seeley, Mark; Registration No. 32,299; Skabrat, Steven P.; Registration No. 36,279; Skaist, Howard A.; Registration No. 36,008; Su, Gene I.; Registration No. 45,140; Wells, Calvin E.; Registration No. 43,256; Werner, Raymond J.; Registration No. 34,752; Winkle, Robert G.; Registration No. 37,474; and Young, Charles K.; Registration No. 39,435 my patent attorneys, of INTEL CORPORATION with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith.

Send correspondence to Timothy N. Trop, TROP, PRUNER & HU, P.C., 8554 Katy Freeway, Ste. 100, Houston, TX 77024 and direct telephone calls to Timothy N. Trop, (713) 468-8880.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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